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IN THE UNITED STATES PATENT & TRADEMARK OFFICE

IN RE APPLICATION OF :

Werner POMPETZKI et al : GROUP ART UNIT: 1621

SERIAL NO: 09/618,044 :

FILED: July 17, 2000 : GROUP ART UNIT: E. Price

FOR: PROCESS FOR THE HYDROGENATION OF ACETONE

REPLY BRIEF

ASSISTANT COMMISSIONER FOR PATENTS
WASHINGTON, D.C. 20231

SIR:

The following is a reply to new points of argument raised by the Examiner in his Answer dated October 8, 2002 of the above identified application.

The Examiner states on page 6, lines 13-16 of the Answer, in his understanding of the Fukuhara et al patent, that patentees consider it absolutely essential to conduct the hydrogenation of acetone in a fixed bed reactor in a manner in which the direction of flow of reactant liquid and hydrogen gas over the catalyst is specific in that it must be a cocurrent liquid/gas downflow over the catalyst bed and that the fixed bed catalyst must be maintained in a trickle bed state (column 2, line 65 to column 3, line 8). The Examiner is quite correct in this statement. However, this disclosure about the hydrogenation process disclosed in the patent clearly adds emphasis to appellants' position that the process of the patent in no way suggests an acetone hydrogenation process that relies upon two essential parameters which are that the hydrogenation of acetone be conducted in a reactor sequence of at least two

reactors and with acetone having a water content of no more than 1 % by weight. In other words, the fact that the patent teaches an entirely different way of hydrogenating acetone in comparison to that of the present invention is clear evidence that patentees did not recognize an entirely different process, based on parameters not shown or suggested in the patent, of producing isopropanol in high conversion of acetone to high yields of alcohol product. Again, in fact, the Examiner acknowledges at page 4, lines 3-6 of the Answer that Fukuhara et al is silent about multiple hydrogenation stages, the percentage of water contained in the acetone substrate and the percentage of by-products, if any. Yet, it is precisely the combination of low water content acetone and successive hydrogenation which make the present process what it is.

The Examiner asserts that there is no reason to believe that the process of Fukuhara et al does not utilize acetone having a water content of less than or equal to 1.0 % by wt. (Page 6, lines 2-5) To the contrary, appellants submit that the patent provides no assurance whatsoever that patentees necessarily use acetone having a water content of no more than 1 %, because, in fact, one of the well known properties of acetone is that it is soluble in water in all portions. Moreover, as to the matter of solvents useful in the process of the patent, it must be noted that the patent at column 2, lines 57-59 states that **water is also useful as a solvent for the hydrogenation reaction disclosed** among other types of solvents such as alcohols and ethers. Accordingly, given the fact, as the Examiner acknowledges, that the patent is silent on the matter of the amount of water in the starting acetone, clearly **one can have no assurance whatever** that the acetone reactant used in the process contains no more than 1 % by wt water. Even if it did, the disclosure of the patent would not meet all of the limitations of the present claims which means that the art would not teach the necessity of two or more successive hydrogenation reactors.

In discussing the Hiles et al patent, the Examiner states at page 7, lines 15-21, that:

> --since appellants have claimed at least two hydrogenation stages in the hydrogenation of the presently claimed acetone, then the Hiles et al reference is considered by the Examiner to be pertinent, analogous prior art which in fact teaches that it is advantageous to implement a multi-stage hydrogenation of unsaturated organic compounds---.

This statement is a clear and unambiguous use of the teachings of the disclosure and claims of the present invention in hindsight to provide basis for combining the teachings of the two patents which have been cited and applied against the present claims. This is highly improper. To the contrary, in order for the Examiner to properly formulate a *prima facie* case of obviousness, three basic criteria must be met (MPEP 706.02(j)) which are:

(i) there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of skill in the art, to modify the reference or to combine reference teachings;

(ii) there must be a reasonable expectation of success; and

(iii) the combined prior art references must teach or suggest all the claim limitations.

As to the matter of motivation to combine references, it must be noted, as mentioned above, that the disclosure of Fukuhara et al is **narrowly** limited to the use of a single **fixed bed** reaction system containing a particulate or granular catalyst that requires a cocurrent downflow of liquid/gas through the fixed catalyst bed and that the catalyst bed must be in a trickle bed state. Accordingly, if the Hiles et al patent is to be of relevance at all, it must contain some disclosure that would motivate the skilled artisan in some way to accomodate the specific teachings of Fukuhara et al and at the same time enhance or improve upon the trickle bed system disclosed in order to result in an improved process of hydrogenation. To the contrary, Hiles et al discloses an entirely different hydrogenation process based on several

reactors none of which are configured to conform with the requirements of Fukuhara et al to maintain a catalyst bed in a trickle bed state where a downflow of liquid (aldehyde reactant)/gas flows through the reactor. Rather, Hiles et al discloses a several reactor hydrogenation apparatus where, as is clear from Figure 1 of the patent and the disclosure in the summary of the invention and in columns 11-13, a first reactor is employed in which hydrogen gas and recycle gas are mixed, then heated and then divided into two streams which enter the reactor at different places while unsaturated organic reactant passes into the reactor at still another point where ultimately the injected material combines and **ascends** the reactor through a catalyst bed. No mention is made whatever of maintaining a trickle bed state in the reactor and certainly there is an **upflow** of gas/liquid, not a downflow as required by Fukuhara et al. The second reactor shown in Figure 1 of the reference is configured in a similar manner to that of the first reactor with a vaporization (packed) lower zone and an upper catalyst zone. Again there is no mention of maintaining trickle bed conditions in the reactor. How then is it possible to combine the two quite different process techniques and arrive at the present invention whose essential requirements are that the acetone feed contain no more than 1 % by wt water and that the hydrogenation be conducted in at least two stages, bearing in mind that neither patent shows or suggests the essential requirement of the present process that the acetone feed contain no more than 1.0 % by wt water? (The fact that neither of the cited references teaches nor suggests the water content limitation of the present claims is a violation of requirement (iii) above.) Accordingly, appellants maintain their position that Hiles et al, in fact, can not be properly combined with Fukuhara et al and therefore the prior art rejection fails.

In view of the comments above, appellants continue to believe that the continued rejection of the claims is erroneous and that the decision by the Examiner should be REVERSED.

Respectfully submitted,

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